Autism Spectrum Disorder (ASD) detection using Deep Learning

Introduction:

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is perceived by a lack of social interaction and emotional intelligence, repetitive, abhorrent, stigmatized, and fixated behaviour (Jaliaawala and Khan 2019). This syndrome is not a rare condition, but a spectrum with numerous disabilities. ICD-10 WHO (World Health Organization 1993) and DSM-IV APA (American Psychiatric Association) (Castillo et al. 2007), outlined criteria for defining ASD in terms of social and behavioral characteristics. According to their nomenclature: an individual facing ASD has an abnormal trend associated with social interaction, lack of verbal and nonverbal communication skills and a limited range of interests in specific tasks and activities.

Project:

Magnetic Imaging Resonance (MRI), a non-invasive technique, has been widely used to study brain regional network(s). Thus, MRI data can be used to reveal subtle variations in neural patterns / network which can help in identifying biomarkers for ASD. MRI scans are further divided into structural MRI (s-MRI) and functional MRI (f-MRI) depending on type of scanning technique used (Bullmore et al. 2009). In this project student to expected to develop machine learning approach to analyze MRI data (either f-MRI or s-MRI or both) to detect ASD.

During this project student may use MRI scan data from Autism Brain Imaging Data Exchange (ABIDE-I) dataset (http://fcon_1000.projects.nitrc.org/indi/abide/abide_I.html). ABIDE is an online sharing consortium that provides neuroimaging data of ASD and control participants with their phenotypic information (Di Martino et al. 2014). ABIDE-I data-set consists of 17 international sites, with total of 1112 subjects or samples, that includes (539 autism cases and 573 healthy control participants).

References:

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